

# Massive hemothorax after thoracic spinal manipulation for acute thoracolumbar pain

Johannes Struwer,<sup>1,2</sup> Thomas Manfred Frangen,<sup>2</sup> Ewgeni Ziring,<sup>2</sup> Ulrike Hinterseher,<sup>3</sup> Ilias Kiriazidis<sup>2</sup>

Departments of <sup>1</sup>Orthopedics and Rheumatology; <sup>2</sup>Trauma, Hand and Reconstructive Surgery, <sup>3</sup>Surgery, University Hospital Marburg, Germany

## Abstract

Spinal manipulation usually represents a widely used and effective method for physicians in order to relieve acute patient pain and muscular dysbalance. Although life-threatening complications (*e.g.* pneumothorax, vertebral artery dissection, stroke) after manual treatment are reported with regard to actual medical literature millions of patients undergo manual treatment to manage thoracolumbar pain each year. The authors present the case of a 17 year old male patient with a life-threatening hemothorax after thoracic high velocity spinal manipulation for acute thoracolumbar pain. The patient required emergency chest tube thoracostomy and afterwards thoracoscopic haemostasis for an intercostal venous lesion. A massive hemothorax after spinal manipulation represents an extremely rare but life-threatening complication. Physicians are encouraged to promote the benefits of manual/chiropractic therapy on the one hand but on the other hand are obliged to educate about potential serious dangers and adverse events.

## Introduction

Chiropractic interventions (manual manipulation of the spine and ribs) are frequently used therapeutic options and are furthermore applied to a growing number of indications.<sup>1,2</sup> Spinal manipulation usually is believed a safe and effective method for physicians in order to relieve acute pain syndromes.<sup>3</sup> Complications associated with chiropractic procedures remain rare and most of the adverse effects reported in literature are benign and remain transitory.<sup>4</sup> On the other hand some life-threatening complications after manual manipulation like vertebral artery dissection, stroke, spinal epidural hematoma and cauda equina syndrome have been reported.<sup>3,5</sup> Serious complications and adverse events have typically been observed after the application of high velocity thrust manoeuvres in particular to the

cervical spine.<sup>1</sup> We describe a case of a 17 year old male patient with a massive hemothorax who required emergency chest tube thoracostomy and thoracoscopic haemostasis for an intercostal venous lesion following thoracic spinal manipulation. To our knowledge, this is the first report focussing on this life-threatening condition.

## Case Report

A 17 year-old male patient was referred to our institution with a massive hemothorax after ambulant high velocity spinal manipulation for acute thoracolumbar pain by an osteopathic physician two days before. The osteopathic physician used the so called Bauerngriff-maneuver which consists of a high velocity thrust to the middle portion of the thoracic spine and the adjacent costo-vertebral joints. During this maneuver the patient is seated with his arms folded in front of his chest with the physician positioned behind him and hugging his arms. The physician then applies the impulse to the seated patient in maximum expiration by pulling him upwards. The medical history according to the osteopathic physician revealed that the patient initially complained about thoracic back pain due to a thoracic spinal joint dysfunction. Afterwards he was treated by auxiliary analgesic medication (NSAR). Two days after the chiropractic procedure he was referred to our institution because of incremental symptoms of thoracic pain and dyspnoea. The patient reported a dull, non-radiating pain that was persistent. The pain was located in the mid region of the anterior and posterior left thorax. In addition he reported of shortness of breath and dyspnoea (both at rest and during exercise). There was no history of previous lung disease or thoracic injury. Physical examination showed a slender patient with a good general state of health. The patient's vital signs (BP: 110/90 mmHG), HR: 100 bpm) were normal with regard to circulation. However a marked decrease of oxygen saturation with 90% under room air was noticed by pulse oximetry. Initial clinical assessment showed a symmetric rise and fall of the chest, but significantly decreased breath sounds to auscultation and hyporesonance to percussion over the left lung field. There was no evidence for external trauma in sense of ecchymosis, edema, or erythema of the thorax. The remainder of the physical examination was normal. Additional laboratory blood examination showed an initial haemoglobin concentration of 10.6 g/dL and a slightly reduced global coagulation (INR: 1.3) with a concomitant normal platelet count (300 g/L). All other laboratory values were normal. Plain radiographs of the chest

Correspondence: Johannes Struwer, Department of Orthopedics and Rheumatology, University Hospital Marburg, Baldingerstraße, 35043 Marburg, Germany. Tel. +49.642.158.64913 -Fax: +49.642.158.67007. E-mail: struwer@med.uni-marburg.de

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demonstrated a large hemothorax with an almost total opacity of the left lung and a slight mediastinal shift (Figure 1).

The patient was immediately treated by a 32 french chest tube. The drain was inserted via mini-open thoracotomy into the 6<sup>th</sup> intercostal space anterior to the mid axillary line. A large hematoma of approximately 2000 mL could be evacuated at once. With regard to the medical history, the sustained trauma (spinal manipulation) was considered as inadequate. As the patient was in a stable overall clinical condition with no clear bleeding source, we additionally performed contrast enhanced CT scan to rule out an aneurysm or other predisposing conditions. The scans confirmed the vast hemothorax and revealed a small anterior pneumothorax (Figure 2). There were neither fractures, bony lesions nor evidence of an active arterial bleeding/aneurysm. Based on our institutional guideline further diagnostic thoracoscopy was initiated and the patient was transferred to the operating room after standard pre-operative anaesthesiologic priming and monitoring. Furthermore due to the slightly deranged global coagulation the patient received 2 units of fresh frozen plasma preoperatively. Intra-operative thoracoscopic evaluation showed a residual hematoma of approximately 1000 mL, no additional visceral lung injury but an active venous bleeding from the intercostal vein adjacent to the third costo-vertebral joint with an additional perforating lesion of the parietal pleura to be identified as source of the small pneumothorax. This was valued as an occurred ventral rib subluxation remaining

the only applicable mechanism to explain the existence of the massive hemothorax in this patient. The small anterior pneumothorax was valued as a result of the previously performed minithoracotomy or the inserted chest tube, as thoracoscopic evaluation showed neither a visceral lung injury nor significant pleural adhesions. Local haemostasis was performed via diathermocoagulation and the residual hematoma was evacuated. Postoperative radiographic evaluation demonstrated complete hematoma evacuation and re-expansion of the left lung with the chest tube in correct position (Figure 3). Afterwards the patient was admitted to the intensive care unit overnight. The postoperative course was without further complications. There was no need for blood transfusion or substitution of further coagulation products..

Complete resolution of the hematopneumothorax was observed, and the thoracic drain could be removed on the 4<sup>th</sup> postoperative day. The patient was discharged in good condition after 7 days overall hospital stay.

## Discussion

Chiropractic spinal manipulation represent a widely used and effective method to relieve acute patient pain and muscular dysbalance.<sup>1,3,6</sup>

There are multiple definitions of chiropractic care including two main types of therapeutic interventions. Firstly spinal manipulation, which is characterised by a high velocity and low amplitude thrust that cannot be resisted by the patient. Secondly spinal mobilization, which is represented by a low-velocity passive motion that can be stopped by the patient himself.<sup>2,7</sup> Contraindications for any chiropractic treatment modality are malignancy or bone-deteriorating diseases like osteopenia and/or advanced osteoporosis.<sup>2,8</sup>

With regard to current literature, there is a large list of indications and therapeutic success has been reported in a lot of cases. Therefore the use of chiropractic techniques is still very popular among physicians. Before considering this treatment option however a careful evaluation of the safety profile remains of vital importance.<sup>8</sup> Reinforcing this necessity there are reports of multiple cases of patients having experienced serious complications after chiropractic manipulation.<sup>2,5,9,10</sup> Based on an actual review of chiropractic interventions adverse reactions are common after spinal manipulation, ranging from 33% to 60.9% of patients.<sup>2</sup> Most adverse events were characterised by local discomfort and

radiating pain.<sup>1,2</sup> These appear frequently in the first hour after treatment and disappear within 24 to 48 hours. The majority of adverse events reported are benign and transitory. But the occurrence of serious or even life-threatening events cannot be excluded.<sup>2,5,8</sup>

Retrospective surveys reported serious mostly neurologic adverse reactions like stroke, myelopathy, radiculopathy, and also subdural haematomas. Other serious adverse reactions reported are: spinal fluid leakage with concomitant intracranial hypotension, herniated disc, diaphragmatic palsy, pathologic fractures of vertebra or even cauda equina syndrome or vertebrobasilar artery dissection.<sup>5,6,10-15</sup>

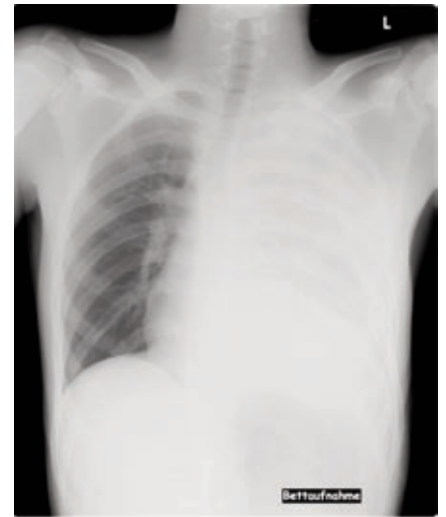
There is one case report concerning a post-interventional pneumothorax as a potential non-neurological life threatening complication.<sup>16</sup> The true risk of injury due to spinal manipulation is not known. With regard to current literature there are only estimates of the incidence of potential serious adverse events. The risk of adverse reactions has been estimated 1 in 40,000 manipulations for mild complications and 1 in 400,000 to over 1,000,000 manipulations for serious complications.<sup>2,7,8</sup>

The reported incidence of neurological or fatal complications is quite variable mainly based on the poor overall data, ranging from 5 strokes/100,000 manipulations to a rate of 2.7 deaths/10,000,000 manipulations, with stroke being the most frequent.<sup>2,5</sup> To our knowledge, the presented case is the first description of a large and life-threatening hemothorax as a result of spinal manipulation.

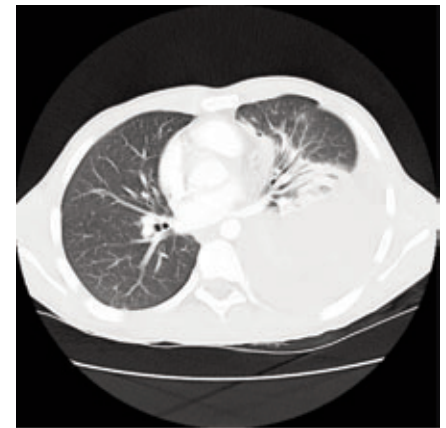
Based on our experience, physicians should be aware of potential adverse effects, specifically with high velocity thrust techniques. Physicians and patients are advised to remain vigilant for potential serious adverse effects that may arise after chiropractic treatment. While the safety and efficacy of manual treatment is widely believed and serious adverse events are only published on occasion, the presented case demonstrates the need for a thorough understanding of individual techniques and the associated risks.

## Conclusions

Spinal manipulation as a non-invasive and often medication-free procedure might constitute for potentially life-threatening adverse effects. The current case report highlights the obligation of physicians to state the benefits of spinal manipulation and to deliberately educate their patients of dangers and possible harmful outcomes.



**Figure 1.** Preoperative x-ray demonstrating a large left sided hemothorax with slight mediastinal shift.



**Figure 2.** Preoperative contrast enhanced computed tomography scan.



**Figure 3.** Postoperative complete evacuation of the hemothorax and re-expansion of the left lung with chest tube in correct position.

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